OPTIONAL ALGEBRA SUMMER PROBLEMS

Directions: If you choose to attempt this assignment, please bring your solutions with you when you report on the first day of school. Please use a pencil (or computer) to neatly record your solutions.

Procedure: Each solution must include the procedure (steps) you used to solve the problem. Include tables, diagrams, written explanations, or other aids when appropriate.

Details: All variables must be defined and final answers must include units. You are encouraged to discuss these problems and strategies with others to strengthen your problem solving abilities.

1. Twenty-four players enter a singles tennis tournament. How many matches must be played to determine the winner of this elimination (once a player loses one match, he/she is eliminated) tournament?

2. A spider is at the bottom of a 50 foot well. It sets out to discover life at the top. Each day the spider climbs 5 feet. But each night it falls back 3 feet. How many days will it take the spider to reach the top of the well?

3. A rope ladder with rungs one foot apart is hanging over the side of a boat. The bottom rung rests on the ocean surface. If the tide rises a foot per hour, how long will it take until all 4 rungs are covered with water?

4. Ten old friends meet at a concert. If each one shakes hands exactly once with each of the others, how many handshakes are there altogether?

5. Looking at the playground, I saw boys and dogs. Counting heads, I got 22. Counting legs, I got 68. How many boys are there?

6. The Krane children were born two years apart. When Michael, the youngest of the six Krane children was 1 year old, the sum of the ages of all the children was 1 + 3 + 5 + 7 + 9 + 11, or 36, a perfect square. How many years old was Michael the next time the sum of the children's ages was a perfect square?

7. Ninety-nine girls and one boy are in a large room. How many girls must leave the room so that the percentage of girls becomes 98%?

8. A pair of dice is rolled. What is the probability that the sum is less than 7?

9. In 1984, it was estimated that 98% of U.S. households had televisions (color or black and white), that 91% of U.S. households had color televisions, and that 70% of U.S. households had black and white televisions. If these figures are accurate, what percent of U.S. households have both types of televisions?

10. How many brothers and sisters are there in a family in which each boy has as many sisters as brothers but each girl has twice as many brothers as sisters?

11. Mother asked Celia to weed the vegetable garden. Celia responded, "I will pull an average of 40 weeds per day." She began rather slowly, weeding the first half of the garden at 20 weeds per day. To make up for her laziness, she weeded the second half by pulling 60 weeds per day. She claimed that she averaged 40 weeds per day since half of 20 + 60 is 40. Her mother, however, said that was not true. Who was right?

12. Given 15 points such that no three are collinear, how many different lines are determined?

13. The symbol [x] represents the greatest integer less than or equal to x. What is the value of x for which the product of [x] and x equals 39?

14. A clock chimes on the hour a number of times equal to the hour and also chimes once every quarter hour. If the face of the clock cannot be seen and the clock has just chimed once, what is the longest time you might have to wait to be sure of knowing the time?

15. At noon, train A leaves San Francisco and train B leaves New York City. Train A averages 50 mph while train B averages 75 mph. If it is 3000 miles by rail from New York to San Francisco, which train is nearer to San Francisco when the trains are passing each other?

Answers to Optional Algebra Summer Problems

1. 23 matches
2. 24 days
3. never
4. 45 handshakes
5. 10 boys
6. 19 years old
7. 50 girls
8. $\frac{5}{12}$
9. 63%
10. 4 brothers, 3 sisters
11. mother
12. 105 lines
13. 6.5
14. 1.5 hours
15. neither